CLAIMS

[1] An automatic parking brake system comprising: a parking piston (23, 103) slidably fitted into a casing (22, 102) so that a parking brake state can be obtained by forward movement in response to a parking control fluid pressure acting on a rear face of the parking piston (23, 103); a lock mechanism (25, 105) provided within the casing (22, 102) to the rear side of the parking piston (23, 103) so as to automatically lock in response to forward movement of the parking piston (23, 103) in order to mechanically lock the parking piston (23, 103) at a forward position and unlock in response to a parking release control fluid pressure acting on the lock mechanism (25, 105); a fluid pressure source (10C; 10A, 10B); and fluid pressure control means (56; 66A, 66B) for controlling a fluid pressure generated by the fluid pressure source (10C; 10A, 10B) so that the parking control fluid pressure and the parking release control fluid pressure can be obtained.

[2] The automatic parking brake system according to Claim 1, wherein the lock mechanism (25, 105) comprises a lock piston (24, 104) slidably fitted into the casing (22, 102) to the rear side of the parking piston (23, 103) so that a forward urging force acts on the lock piston (24, 104) at least when the parking piston (23, 103) moves forward and allowing a parking release control pressure to be made to act on the lock piston (24, 104) toward the rear; a cylindrical retaining tube (51) integrally and coaxially connected to a rear part of the parking piston (23, 103); spheres (52) retained at a plurality of positions in the peripheral direction of the retaining tube (51) so that the spheres (52) can move along the radial direction of the retaining tube (51); and an insertion shaft (53) inserted into the retaining tube (51) so that the insertion shaft (53) can move axially relative to the retaining tube (51) and connected integrally to the front end of the lock piston (24, 104) so as to be in contact with the spheres (52) from the inside of the retaining tube (51); a large diameter hole portion (21c, 101b) having a larger diameter than that of the retaining tube (51) and a small diameter hole portion (21d, 101c) being formed on an inner face of the casing (22, 102) between the parking piston (23, 103) and the lock piston (24, 104) so that a

forward-facing annular latching step (21g, 101f) is interposed between the large diameter hole portion (21c, 101b) and the small diameter hole portion (21d, 101c), the small diameter hole portion (21d, 101c) being formed so as to have a smaller diameter than that of the large diameter hole portion (21c, 101b) and be able to be inserted into the retaining tube (51) and being disposed to the rear of the large diameter hole portion (21c, 101b); and the insertion shaft (53) being formed by coaxially and integrally connecting a front small diameter shaft portion (53a) and a rear large diameter shaft portion (53b) via a tapered step (53c) that is capable of changing the position of contact of each of the spheres (52) between the small diameter shaft portion (53a) and the large diameter shaft portion (53b), the small diameter shaft portion (53a) being in contact with each of the spheres (52) so as to be capable of putting each of the spheres (52) in rolling contact with an inner face of the small diameter hole portion (21d, 101c) in a state in which the parking piston (23, 103) is at a retreat limit, and the large diameter shaft portion (53b) being connected coaxially to the small diameter shaft portion (53a) so as to be capable of pushing each of the spheres (52) outward along the radial direction of the retaining tube (51) in order to make the spheres (52) contact the large diameter hole portion (21c, 101b) in response to the parking piston (23, 103) moving forward from the retreat limit and the lock piston (24, 104) moving forward.

[3] The automatic parking brake system according to either Claim 1 or Claim 2, wherein an adjustment mechanism (82) is provided within a brake caliper (75) forming a brake fluid pressure chamber (80), a brake piston (78) being slidably fitted into a cylinder hole (76) of the brake caliper (75) and having a rear face facing the brake fluid pressure chamber (80), the adjustment mechanism (82) comprising an adjustment nut (83) connected to the brake piston (78) so that relative rotation is not possible and housed in the brake fluid pressure chamber (80), an adjustment bolt (84) having a front end part screwed into the adjustment nut (83), a relay piston (85) disposed in a rear part of the brake fluid pressure chamber (80) and slidably fitted into the brake caliper (75) in a liquid-tight manner so that the relay piston (85) cannot

rotate around the axis but can move in the axial direction, and a small piston (86) integrally and coaxially connected to a rear part of the adjustment bolt (84), slidably fitted into the relay piston (85) in a liquid-tight manner, and resiliently urged in a direction in which the small piston (86) frictionally engages with the relay piston (85), the parking piston (103) abutting against the relay piston (85) from the rear side and being slidably fitted into the casing (102) connected to the brake caliper (75), and the lock mechanism (105) being provided within the casing (102) to the rear side of the parking piston (103).